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## PREFACE

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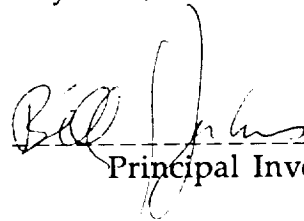
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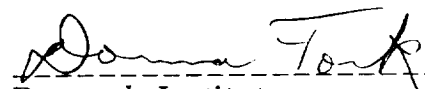
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I have reviewed this report, dated February 1997, and the report contains no classified information.

  
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AERO-OPTICS DATA REDUCTION AND ANALYSIS  
(5-33745)

Final Technical Report for Period  
April 4, 1996 through December 31, 1996

(February, 1997)

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# AERO-OPTICS HOLOGRAPHIC DATA REDUCTION AND DATA BASE MAINTENANCE

## 1.0 Introduction.

Under a recent delivery order performed for the Systems Simulation and Development Directorate, the University of Alabama in Huntsville has set up and verified a facility to reconstruct and analyze wavefront distortion caused by endoatmospheric aero-optical effects using interferograms made in the Aero-Optics Evaluation Center (AOEC). UAH has also configured a database shell for managing aero-optical data from all sources.

## 2.0 Accomplishments.

2.1 This delivery order has provided the Systems Simulation and Development Directorate (SS&DD) with wavefront reconstruction and aero-optical analysis, database input and database maintenance for aero-optics experiments conducted in the AOEC during 1996. This effort consisted of the following tasks:

### 1. Data reduction

Sixty-seven photographic plates exposed during the AIT tests in the AOEC were digitized and processed using phase shift interferometry to yield flow degraded phase maps plus tare phase maps. All other data from the test has already been converted to engineering units.

### 2. Data analysis

a. The digitized fringe patterns were analyzed for wavefront statistics, variance of the wavefront from planarity, and pseudo point spread function (PSF), and Strehl ratio. Pseudo-PSFs were scaled to infrared wavelengths and compared to IR point source image derived data.

b. The visible and IR images were analyzed to produce PSF and encircled energy plots and compared with ideal patterns to infer Strehl ratios.

c. Boresight error measurements proved to be corrupted and were not processed.

### 3. Data base maintenance

a. The products of data analysis as described in the preceding paragraph were entered into the aero-optics data base shell developed previously for SS&DD.

### 3.0 Conclusion

The implication of findings resulting from this delivery order have been communicated to the COTR.